Title: "Numbers Make Sense"

Brief Overview:

This unit emphasizes the importance of understanding the relationships among numbers. The prerequisite skills for this unit include place value knowledge, and including decomposition of whole numbers into tens and ones. This unit uses friendly childhood themes including fables, and sports.

NCTM Content Standard/National Science Education Standard:

- Use multiple models to develop initial understandings of place value and the base-ten number system;
- Understand various meanings of addition and subtraction of whole numbers and the relationship between the two operations;
- Understand the effects of adding and subtracting whole numbers
- Use a variety of methods and tools to compute, including objects, mental computation, estimation, paper and pencil, and calculators.

Grade/Level:

Grade 2

Duration/Length:

3 days (75minutes per day)
1 additional day will be used for assessment

Student Outcomes:

Students will:

- Identify ways of counting and identifying tens and then ones when using a hundreds chart.
- Identify the relationship between the numbers in a number sentence and the relationship of part to whole.
- Identify and create a fact family using three numbers and an operation sign.

Materials and Resources:
Lesson 1
- Student Resource 1, one per student
- Teacher Resource 1, one copy
- 4x6 index cards, one per student
- Teacher Resource 2, transparency (See Appendix A)
- Teacher Resource 2, 6 copies (See Appendix A)
- Student Resource 3, one per 2 students (See Appendix B)
- Student Resource 4, one per 2 students (See Appendix B)

- Large paper clips (2)
- Paper clips, (one per student)
- Pencils (one per student)
- 1 transparency

Lesson 2
- LCD projector
- Student Resource 5, Group 1 only, (amount will vary, see Appendix B)
- Scissors (one per student)
- Teacher Resource 2 (amount may vary see Appendix A)
- 4x6 index cards (one per student)
- Teacher Response 9, transparency
- Cubes
- Cuisenaire Rods, one per student
- 2 copies of Student Resource 9 (See Appendix B)

Lesson 3
- 3x5 index cards, one per student
- Masking tape
- 1 Rubber ball
- Student Resource 14 (See Appendix B)
- Teacher Resource 5 (See Appendix A)
- Teacher Resource 6 (See Appendix A)
- Dice (two for each pair)

Development/Procedures:

Lesson 1

Pre-Assessment – Distribute the pre-assessment (Student Resource, Number Sense, 1) to each student. Answers can be found on Teacher Resource 1.

Launch –
- Label enough index cards for the class with the number 10 on the blank side. (See below.)
- Distribute an index card to each student.
- Students should put their names on the right hand corner.
- Say: "*We are going to be working on a new unit. In this unit the number 10 is very important. I want you to write down on your card everything you know about the number 10. Think about things that come in groups of 10. Think about how to make 10. I will give you a couple of minutes to complete this. You may begin.*"

- Give students 3-5 minutes to complete the card.
- Student responses may include having ten fingers, ten toes, being ten years old, etc.
- Collect the cards, as they will be used later for anecdotal notes.

Teacher Facilitation –
- Display a copy of a hundred chart, on an overhead transparency. Students will use the hundred chart to play the game, The Tortoise and the Hare (Teacher Resource 2).
- Follow these rules to play:
    1. Pick a partner. Each partner must pick a game marker.
    2. Using Spinner A (Student Resource 3) and a paper clip, each player spins the spinner. The person who spins the highest number will go first.
    3. The number matching the day's date will be the starting point on the Hundred chart. (If today is June 22, the game will start on the number 22.)
    4. * Tortoise may only spin Spinner B; Hare may only spin spinner A (Student Resource 3)
    5. Tortoise or Hare starts the game. Spin the spinner and then move the number of spaces on the Hundred chart as stated on the spinner. If spinner lands on 0 the person loses a turn. They record their movement on the Student Resource 4. The other player completes the same process using their appointed spinner.
    6. The person closest to 100 after 5 spins is the winner.
- For the demonstration, the teacher assumes the role of the Tortoise and the class takes the role of the Hare.
- The teacher should elicit the help of various students to spin the spinner and move game markers.
- Ask the students the following questions: *What did you notice? Was there a difference between how fast the Tortoise was moving compared to how fast the Hare was moving?" Make a prediction. If we kept spinning the spinner who would win the race? Why would they would the win the race*?" Guide the discussion to the understanding that the Hare would win the race due to the fact that the Hare is moving by a multiple of 10 each time while the tortoise is only moving 1-9 spaces each time. The Hare will likely win because it is moving a larger amount of spaces. It is easier or quicker to move in groups of 10.

- Refer back to the launch activity. Inform the students that 10 is an important number when counting. Just like the Hare it is faster to move counting by 10's than by ones.
- Review the left to right and up and down notion when using a hundreds chart. Start at number 19. Using student volunteers have one student spin spinner A and another student spin spinner B. For example, if Spinner A landed on 8, start at 19 and move forward 8 spaces to 27. If spinner B landed on 30, go down 3 rows, adding 10 three times. Use this same concept to create a riddle. Display Student Resource 5. Cooperatively work with the class to develop a group riddle.
- Guide student's thinking and discussion for clues to include "amount". For example, instead of saying up 1 or up 5, students should state answers like increase by 35 or decrease by 56. See answer key for an example on Teacher Resource 2.

Student Application –
- Separate the students into two groups. Use the index cards from the LAUNCH part of the lesson.
- Distribute Student Resource 5 to Group 1. They will create a riddle for another member in the group.
- Remind the students that they should leave the secret number blank.
- Group 2 will work with the teacher gaining more practice using the hundreds chart. Pair students into groups of two. Students start on the number 1. They will spin one spinner at a time moving accordingly. The goal is for both players to reach the number 100. They must work together and encourage each other to make sure they both reach the desired goal.

Embedded Assessment –
- While the students are playing the game observe and record behaviors on the back of the index cards from LAUNCH activity. Use this rating scale to assess students' understanding.
    - **0-** Student's understanding is incorrect
    - **1-** Student shows minimal or partial understanding
    - **2-** Student shows complete understanding

Reteaching/Extension –
- For those who have not completely understood the lesson, complete hundred chart puzzles. These puzzles can be easily assembled using Student Resource 2. Cut the hundred chart into different shapes, place the cut up shapes in a bag, and then distribute it to the students. Students will put them together.
- For those who have understood the lesson, play the game Touchdown 100. Student Resource 6-8.

Lesson 2

Pre-Assessment
- Distribute an index card to each student.
- Have students fold the card in half.
- Let students pick a number between 50 and 100. Place this number on the left hand side of the card.
- Ask students to write their names on the card, and count the number of letters in their first names. If there is an even amount of letters in their first name they should increase their number by 10. If there is an odd amount of letters in their name they should decrease their number by 10. See example below.
- Save cards for anecdotal notes.

	Name (Name has 4 letters)
65	75

Launch
- Ask the students, *"What is the difference between a part and a whole?"*
- Display a Part-Part-Total Mat on an LCD Projector. (Student Resource Sheet 9) Say, *"Looking at the picture, which space would be a part? Which space is the whole?"*
- Place 6 cubes in one of the "Part" sections. Ask students to count the number of cubes.
- Place 4 cubes in the other section labeled, "Part". Ask students to count these cubes.
- Move all of the cubes into the "Total" section. Have the students count these cubes.
- Repeat this process 3 more times using a total of 20 cubes. Elicit the help of student volunteers.
- Discuss what the students observed by asking the following questions; "*What did you notice? Did the numbers in the total section increase or decrease? Explain your reasoning.*
- Say:*" What would happen if we started with all of the cubes in the total section and then moved some into the part section?*
- Complete 3-5 examples starting with all cubes in the total section and then move some into the part section.
- Ask the students the following questions after showing these examples. "*What did you notice? The numbers in the total section increase or decrease? Explain your reasoning.*
- Pick one part + part =total example and write the number sentence. Explain the labels to the students. Repeat the process with a whole part = part.

Teacher Facilitation
- Divide the students into three small groups.
- Revisit the Touchdown 100 game from Lesson 1 with Group 1.
- Label the part to whole relationships with addition and subtraction with Group 2 using Student Resource 10, Flash Cards.
- Have students color each individual flash card and cut them out. When done, allow students to paste flash cards on the part to whole work mat. (Student Resource 9 -10)
- Using Cuisenaire rods with group 3 explore the part to whole relationship.
- Review the value of each piece using Student Resource 11 as a guide.
- Complete the first 3 questions on Student Resource 12 with the class.
- Place the black Cuisenaire rod in the whole/total section.
- Ask students to find what two parts would give you a total equal to black .....(Answers include: white + dark green, red + yellow, light green + pink this includes the reciprocals of these colors).
- Ask: *"What kind of problem did we just do*? Use Every Pupil Response: Thumbs Up: addition; Thumbs down subtraction. Engage students to explain their choice.
- Have students place a dark green in the total section and a pink in one of the part sections. They need to know how to find the other part. Say, "Which one rod would complete our part/part/total relationship?" (Red) Continue for additional practice.

Student Application
- Students will complete Student Resource 12 independently. (Problems 4 through 10 on their own**)**

Embedded Assessment:
- As students are working, evaluate understanding using the criteria below. Record observations on pre-assessment cards:

    0-Student's understanding is incorrect
    1-Student shows minimal or partial understanding
    2-Student shows complete understanding in one operation (either addition or subtraction
    3-Student shows complete understanding in both operations

Reteaching/Extension
- Students will get another opportunity to practice the skill when they rotate to "Group 2" activity (Reteach)
- "Ten Go Fish" Student Resource 13 (Extension)

Lesson 3
Advanced Preparation-
- Create a square using masking tape on the floor.
- Place a soft ball in the center of the square.
- Write, "What do you know about fact families?" on a chalkboard.
- Place one 3x5 index card on each student's desk.

Pre-assessment – "What do you know about fact families?

- Have students brainstorm for a brief second about fact families. Ask students to record their thoughts on the 3x5 index card that was placed on their desks.
- Have students stand on the square with their index cards. Note: This process should take no longer than three to five minutes.
- Tossing the ball to any student and ask, **"What do you know about fact families?"** Students will respond with the answer on their card. This process will continue until everyone has had a turn to answer the question.

Launch –
- Say: *"Today we are going to learn about fact families."* Display a picture of a window using an LCD Projector (See Teacher Resource 3 and 4). Be sure to write your addends above the window (for example, 5, 6, and 11).
- Challenge students to create 2 addition number sentences and 2 subtraction number sentences with these numbers.
- Ask volunteers to complete the answers to the problem. Explain to students that you only use the numbers that are in the fact family. Remind students of the previous lesson where students used a part-part-total mat.

5   6   11

____ +6=11	____+5=11
11-____=6	11-____=5

*See Teacher Resource Sheet 4 for answers.

Teacher Facilitation –

- Write the numbers three, four, and seven on the board. Have students find the coordinating Cuisenaire rods (light green, pink and black). Say, *"We learned in a previous lesson that part plus part equals total. Looking at our rods which are the parts and which is the total? We know that if we add three and four or four and three we will get seven*
- Write the number sentence 3+4=7. Move the colors around, write the number sentence 4+3=7. The sum will always be the same. Remember, the rule in addition allows you to add in any order. "
- Say, "Now we have to subtract by using the two sums, which was seven first." Remind students that the order matters in subtraction.
- Say, *"The two numbers that are left in our fact family are three and four, our parts. Now we need to subtract three to seven and four to seven. When we three from seven we get four and when we subtract four from seven we get three. Remember that you can only use the numbers that are in the fact family."*
- Say, *Using the Cuisenaire rod that is black. Suppose we take the light green rod away. What color would be left?*
- Explain that the pink section is needed to write the sentence 7-3=4

Student Application –

- Distribute 2 copies of Student Resource 4
- Have students pick 3 numbers to create the family and fill in the blanks.

Embedded Assessment-

Allow students to revisit the 3x5 cards that were placed on their desks during the beginning of the lesson. Ask students to write what they have learned about fact families on the back of their 3x5 index cards. While students are working you may make an informal assessment of students' understanding of this skill. Develop a rubric. For example,

- 0- Student's understanding is completely incorrect
- 1- Student shows minimal or partial understanding
- 2- Student shows complete understanding

Collect each student's 3x5 index card. You may use these cards as away to determine which students need re-teaching and or an extension.

Reteaching/Extension –

- For students having difficulty understanding the concept, play the fact family game with them in a small group. Question students frequently until they gain their own understanding for fact families
- For those students who understand fact families they can visit the following website: www.ezschool.com/Games/G1-G3FactFamily.html (Follow directions given on the website)

- Have students work with a partner.
- Distribute two dozen egg cartons as well as two dice for each pair of students.
- Pre-cut student resource sheet 15 and distribute that out to each pair as well.
- Instruct students to take turns rolling dyes. For example, if the first student who rolls the dyes received a one and a five. The student who rolled the dyes first has to be able to come up with the sum as well as the fact family only using the numbers one, five, and six. Using the egg carton, students will have to place each number on each egg tray. Students will continue this process by taking turns.

Summative Assessment
- At the end of the unit students should take the post-assessment, Student Resource 16, to measure growth.
- Use Teacher Resource 5 as the answer key for the assessment.

Appendix A: Teacher Resources

Appendix B: Student Resources

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Name_____ Date_____

Number Sense
Pre/Post Assessment.

Label the missing numbers from the hundred's chart.

1.

27	**28**	29
37	38	**39**
47	48	**49**

78	*79*	*80*
77	**89**	90
97	*98*	**100**

2. Increase or Decrease the number by 10

Increase by 10   Decrease by 10

45_____55_____   45_____35_____

32_____43_____   32_____22_____

78_____88_____   78_____68_____

3. Fact Families

Use the numbers in the box only to create a fact family.

5	11	6

a. _____5_____ + _____6_____= ___11_____

b. _____6_____ + _____5_____= _____11____

c. _____11_____ - _____5_____= _____6_____

d. _____11_____ - _____6_____= _____5_____

4. Chose 3 numbers and create your own fact family on the lines below
(Answers may vary but answers should include only 3 of the same numbers that make a 2 true addition and 2 subtraction number sentences.)

a. _____ + _____= _____

b. _____ + _____= _____

c. _____ - _____= _____

d. _____ - _____= _____

Part to Whole

5. Ken has 28 pieces of candy. Kelly has 31 pieces of candy. All together they have 59 pieces of candy.

Part A

31   28   59

What numbers can be identified as the parts

31, 28 (both numbers need to be listed for item to be correct)

Part B

Use what you know about part to whole relationships to explain your answer. Use numbers, pictures, and or words in your explanation.

31 and 28 are the parts because in a part to whole relationship the whole is always bigger than the part. Out of the numbers there 59 is the biggest. Or Two smaller parts together make a larger part. Or 28 part   31 part 59 whole. Students may also draw a part- part –whole chart and fill in the numbers.

Student answers may vary but secret number should be justified by directions. Directions should be written in numerical values. An example is found below.

Hundred Chart

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100

Using the clues try to find the secret number.

Start on Number: 54
Increase: 45 (down 4 right 5)

Decrease: 36 (up 3 left 6)

Increase: 20 (down 2)

Decrease: 3 (left 3)

The Secret Number is: 80

Name_____ Date_____

5 , 6 11

_ +6=11

_+ 5=11

11-_=6

11-_=5

Name_____ Date_____

5 , 6 11

5 +6=11

6 + 5=11

11-5=6

11-6=5
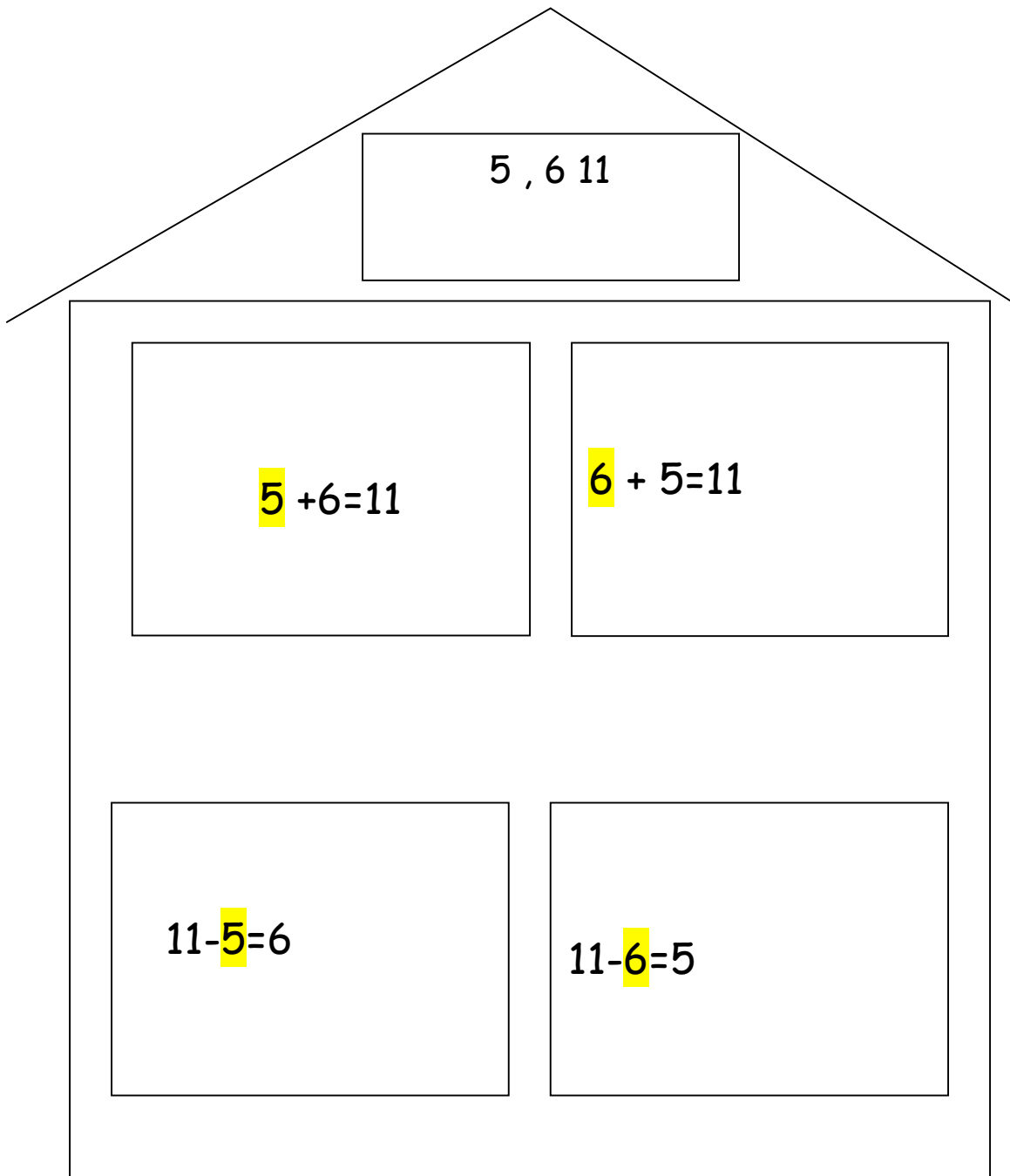
Name_____ Date_____

Numbers Make Sense

Post-Assessment

The charts below are part of a hundred chart. Label the missing numbers using what you know about patterns in a hundred chart.

1.

27	28	29
37	38	39
47	48	49

2. Fact Families

Use the numbers in the box only to create a fact family.

5	11	6

a. _____5_____   + _____6_____= _____11_____

b. _____6_____   + _____5_____= _____11_____

c. _____11_____   - _____5_____= _____6_____

d. _____11_____   - _____6_____= _____5_____

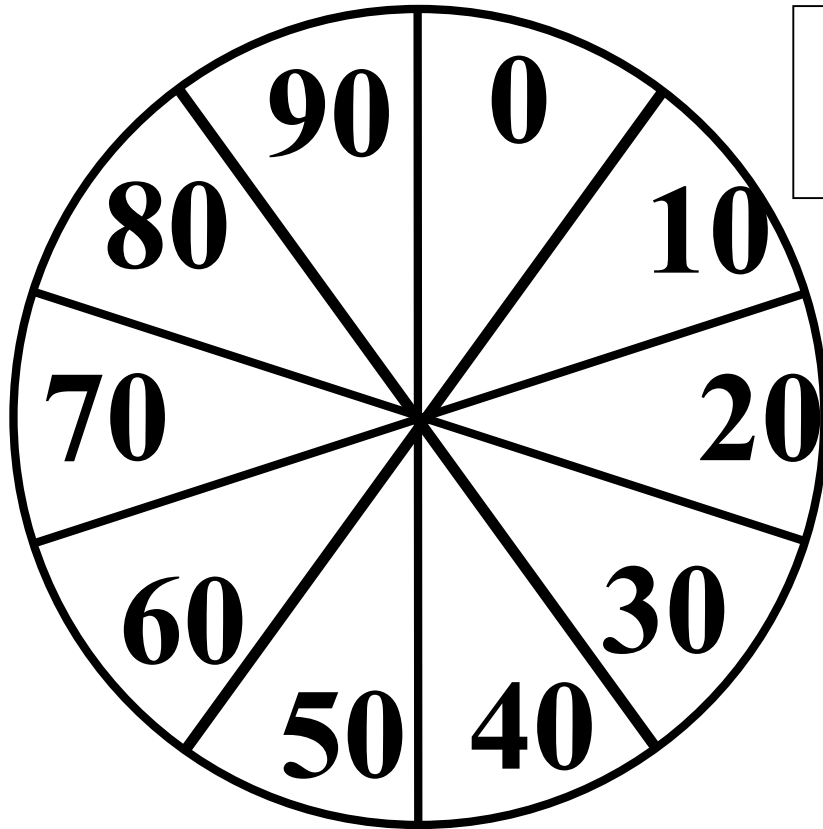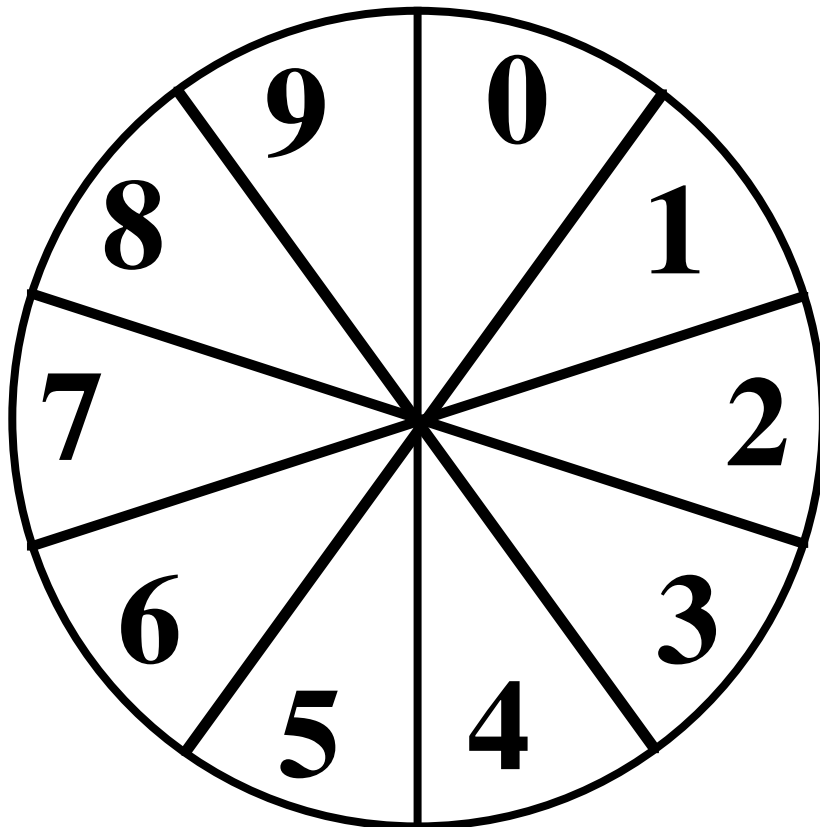3. Label the missing parts or whole using what you know about part-part-whole relationships.

10	
? __7___	3

? ____12___	
7	5

Name_____ Date_____

Numbers Make Sense

Pre Assessment

The charts below are part of a hundred chart. Label the missing numbers using what you know about patterns in a hundred chart.

1.

	28	
		39
47		49

2. Fact Families

Use the numbers in the box only to create a fact family.

5	11	6

a. _____ + _____= _____

b. _____ + _____= _____

c. _____ - _____= _____

d. _____ - _____= _____

3. Label the missing parts or whole using what you know about part-part-whole relationships.

10	
? _____	3

? _____	
7	5

Hundred Chart

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100

A

90 0 10 80 20 70 30 60 50 40

B

9 0 1 8 2 7 3 6 4 5

Name_____ Date_____

<u>The Tortoise and Hare</u>

Tortoise-Spinner B

Use this sheet to record your placement on the 100 chart after each spin.

Spin number	I started on	I spun a	I stopped on
1			
2			
3			
4			
5			

Name_____ Date_____

<u>The Tortoise and Hare</u>

Hare-Spinner A

Use this sheet to record your placement on the 100 chart after each spin.

Spin number	I started on	I spun a	I stopped on
1			
2			
3			
4			
5			

Name_____

Hundred Chart

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100

Using the clues try to find the secret number.

Start on Number _____

Increase _____

Decrease_____

Increase_____

Decrease_____

The Secret Number is _____

Touchdown 100
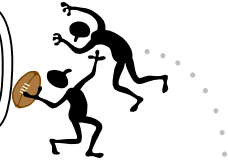
1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100

Touchdown 1

Touchdown 100

Materials
- 2 different color game markers
- Numeral cards 1-50 (You may want to enlarge cards on photocopier Student Resource 8)
- Touchdown game board. Student Resource 7

Touchdown- 2 players
1. Players will score touchdowns by either moving their marker forward to 100 or moving their marker backward to 1.
2. Decide who will go first by telling each player to pick a numeral card. The person with the highest card will go first. One player places his/her marker on space number 1, while the other player places his/her marker on the space marked 100.
3. Players take turns picking numeral cards, (These cards represent the number of yards the team will run to either move forward or backward depending on the starting position). For example a player picks the card, 38, moving from the 100 space. He/she would move up 3 spaces and then 8 spaces to the left. When a player gets to 100 or 1 they have scored a touchdown. At the end of a given time, the student with the most touchdowns wins the game!

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50

Whole/Total	
Part	Part

Resource 10

Flash Cards

5+8=13
4+3=7
2+8=10
9+2=11
6+3=9
7−3=4
9−3=6
11−2=9
13−8=5
10−8=2
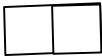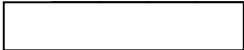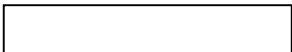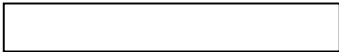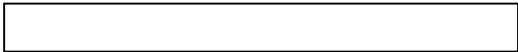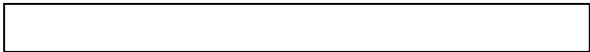
Cuisenaire Rod Reference Sheet

	1 WHITE
	2 RED
	3 LIGHT GREEN
	4 PINK
	5 YELLOW
	6 DARK GREEN
	7 BLACK
	8 BROWN
	9 BLUE
	10 ORANGE

Name_____ Date_____

Directions: Use the Cuisenaire Rods and the part-part-total mat to answer the questions below.

PART	PART
TOTAL	

Example: PINK + WHITE= YELLOW

1. RED + YELLOW=_____

2. YELLOW + LIGHT GREEN=_____

3. _____ + DARK GREEN=ORANGE

4. BLUE – BLACK=_____

5. ORANGE-_____=BROWN

6. _____-LIGHT GREEN= PINK

*CHALLENGE

DARK GREEN + BLUE= YELLOW+_____

Ten Fish

Played like the traditional "Go Fish" game with a twist!

Object: To be the first person without any cards.

Materials

- A deck of playing cards with Jack and King removed
    - Ace=1
    - Queen=0

Directions

1. Each person receives 5 cards.
2. Players look at the cards in their hands. Find matches that equal 10. (For example 7 and 3=10)
3. After you have found all "matches" in your hand, you may ask the player to your left if they have the needed card to make a ten (For example, if you have an 8 in your hand, you would need to ask for a 2 to make a ten.)
4. If the player does not have the needed card he/she simply replies, "Go 10 fish". One card is picked from the deck.
5. Play continues in this manner until one player is out of cards.

Name_____ Date_____

_____ _____ _____

_____ + _____ = _____

_____ + _____ = _____

_____ - _____ = _____

_____ - _____ = _____

Fact Family

+	1	1	1	1	2	2	2	2
-	3	3	3	3	4	4	4	4
=	5	5	5	5	6	6	6	6
	7	7	7	7	8	8	8	8
	9	9	9	9	10	10	10	10
	11	11	11	11	12	12	12	12

Name_____ Date_____

Number Sense
Post-Assessment.

Label the missing numbers from the hundred's chart.

1.

	28	
		39
47		49

78		
	89	
		100

Increase or Decrease the number by 10

2.

Increase by 10   Decrease by 10

45_____   45_____

32_____   32_____

78_____   78_____

3. Fact Families

Use the numbers in the box only to create a fact family.

5	11	6

a. _____ + _____ = _____

b. _____ + _____ = _____

c. _____ - _____ = _____

d. _____ - _____ = _____

4. Choose 3 numbers and create your own fact family on the lines below.

_____ _____ _____

a. _____ + _____ = _____

b. _____ + _____ = _____

c. _____ - _____ = _____

d. _____ - _____ = _____

Part to Whole

5. Ken has 28 pieces of candy. Kelly has 31 pieces of candy. All together they have 59 pieces of candy.

Part A

31   38   59

What numbers can be identified as the parts

_____

Part B

Use what you know about part to whole relationships to explain your answer. Use numbers, pictures, and/or words in your explanation.

_____

_____

_____

_____

_____

_____